Looking Long-Term: Do Environmental Education Programs Have Lasting Impacts on Perceptions of Nature?

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Sarah Rhodes

The Ohio State University

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Advisor: Dr. Kristi Lekies

School of Environment and Natural Resources

The Ohio State University

Abstract

Environmental education seeks to develop a population that is concerned about the environment and its associated problems, and which is dedicated to solving these issues. Much of prior research has focused on the short-term success of environmental education programs for youth, and there has been little attention paid to whether these experiences have lasting effects into adulthood. This study focuses on youth involvement in organized environmental education opportunities through non-school and school-based programs and environmental perceptions as young adults. The data used in this study were collected through an online survey of university students (N=927). This preliminary analysis indicates there are slight positive impacts of youth participation in environmental education efforts on individuals' environmental perceptions of nature. These findings suggest that further evaluation of the long-term impacts of environmental education is crucial so that formal and informal programs and efforts can be more intentionally developed to engage young people in the environment in life-long, meaningful ways.

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Table of Contents

List of Tables & Figures

Chapter I

Introduction

Environmental education teaches individuals to learn about and investigate the natural world and to make intelligent, informed decisions about how they can take care of it (Hollweg et al. 2011). Today's world is plagued by increasingly complicated environmental challenges and a population that is increasingly disconnected from nature. Since the early part of the twenty-first century growing concern and attention has focused on children's declining connection to the natural world. Parents, educators and policymakers are concerned that children may be spending less time outdoors and that disconnection from nature may have detrimental effects on youth development (Louv 2008). The last few decades have also brought widespread recognition of the integral role environmental education must play in society as we address an unprecedented number of critical environmental issues (Hollweg et al. 2011; Rennie 2008).

Environmental education efforts occur in a variety of settings such as formal, in-school education programs and non-school, informal nature-experience based programs. These informal programs often take place through organizations such as Scouts, 4-H, or outdoor camps in which children interact with and learn about the natural environment. Environmental education involves a wide variety of subject matter and skills development—ecology and natural sciences, social sciences, communication, critical thinking and problem-solving skills—because understanding how the environment works and actively addressing environmental issues involve knowledge and skills from many disciplines (Hollweg et al. 2011; Wals 1994).

Several studies have been completed that look more closely at the role of formative experiences on children's attitudes toward and relationships with nature. Research has shown

that “hands-on” nature experiences and time spent outdoors can provide a meaningful transition to learning and caring about environmental issues (Brody 2005; Burgess & Mayer-Smith 2011; Chawla 1998; 2007; D’Amato & Krasny 2011; Emmons 1997; Wells & Lekies 2006). Similarly, many studies have found that participation in school-based environmental education programming can affect students’ environmental attitudes, behaviors, and behavioral intentions (Bodzin 2008; Bogner 1998; Cronin-Jones 2000; Leeming et al. 1995; Skelly & Zajiek 1998). Learning more about the ways that non-school and school-based environmental education can provide a path for positive development of environmental relationships is of incredible importance to the future of successful environmental education efforts.

Environmental education has often faced harsh criticism over its limited ability to successfully accomplish goals of altering individuals’ life-long environmental attitudes and behaviors towards nature (Rennie 2008; Saylan & Blumstein; Wals 1992). Most studies examining the effects of environmental education programs have focused on the short-term effects these efforts have on participants’ environmental attitudes and behaviors. These are typically measured immediately upon completion of a program or within the following year (Wells & Lekies 2012). Future research is needed to understand the degree to which environmental education efforts inspire lifelong environmentalism.

Further research is also necessary to understand how participants in environmental education relate to the material they are taught and the natural world itself. Some research has been identified that discusses the perceptions and meanings of nature children and youth hold (Aaron & Witt 2011; Lekies et al. 2013). How do they define, perceive and experience nature? For example, do they see nature as a place of enjoyment or as a place of fear and danger? Studies indicate young people view nature in different ways, both positive and negative (Aaron

& Witt 2011; Bonnett & Williams 1998; Burgess & Mayer-Smith 2011; Payne 1998; Wals 1994).

Additionally, understanding perceptions of nature is important for those who plan environmental education opportunities. Are environmental education activities and programs designed with knowledge—or assumptions—about the participants' attitudes, beliefs and prior experiences? Preliminary studies have shown that environmental education programs can alter participants' perceptions of nature in the short-term (Emmons 1997; Burgess & Mayer-Smith 2011). An understanding of the ideas about nature that people bring to or take away from the educational experiences is critical in understanding human-nature interactions across the life span, as well as designing meaningful environmental education activities (Keliher 1997; Payne 1998; Simmons 1994; Wals 1994).

Significance of the Study

The idea that environmental education efforts can provide a path for positive development, both individual and societal, by building environmental relationships is widely accepted. However, there are several crucial shortcomings in environmental education research. Environmental education efforts are often designed with little thought to the prior experiences and ideas about nature and the natural environment that students bring with them (Payne 1998; Wals 1992; 1994). Little attention has been paid to the way young people make sense of their own environment through everyday interactions with the natural world (Wals 1992). Recognizing that youths' experiences and ideas are often unique and context-dependent will allow environmental educators to design materials that will increase the probability of meeting learning goals (James & Bixler 2008; Keliher 1997).

Also a consideration, the current understanding of environmental education programs' long-term success in changing individuals' environmental attitudes and behaviors is extremely limited (Rickinson 2001). There is a limited understanding of nature experiences and how they impact learners' perceptions and experiences of the environment and environmental education programs (Rickinson 2001). Without a better understanding of environmental education's potential lifelong impacts, it is impossible to validate and improve current educational programming.

Purpose of the Study

The purpose of this study was to identify possible connections between individuals' childhood involvement in organized environmental educational activities and young adult perceptions of nature as a tentative step toward understanding the long-term effects of environmental education programs. The organized activities reviewed within this study were defined as the following: nature or environmental education in school and nature-related activities outside of school (such as through Scouts, 4-H or summer camp). The perceptions of nature considered within the scope of this paper include nature as associated with: fun and enjoyment, danger, stress reduction, fear, excitement and relaxation.

Objectives of the Study

This project was completed to gain insight into whether or not youth participation in environmental education programs influences their perceptions of nature as adults. After reviewing the relevant literature, specific goals were outlined to further define this study's purpose. In order to address these goals, the following questions were identified (as listed below).

1. What percentage of university students participated in environmental education activities as children?
2. What are college students' perceptions of nature?
3. Is there a difference in perceptions of nature based on experience in environmental education activities?

It was hypothesized that respondents who indicated they had childhood involvement in environmental education programs would rate positive perceptions significantly higher and negative perceptions significantly lower than those respondents who indicated they did not have experience with these activities.

Chapter II

Review of Literature

The literature review in this chapter covers the topics of environmental education, environmental education research, youth perceptions of nature, and the effects of environmental education programs on children and youth perceptions of nature.

The Development of Environmental Education

A definition of "environmental education" first appeared in the first edition of *The Journal of Environmental Education* in 1969, authored by William B. Stapp, et al. Stapp et al. (1969) described environmental education as being "aimed at producing a citizenry that is knowledgeable concerning the biophysical environment and its associated problems, aware of how to help solve these problems, and motivated to work toward their solution" (Stapp et al. 1969). Later that same year President Nixon passed the National Environmental Education Act, which was intended to incorporate environmental education into K-12 schools. The first Earth Day on April 22, 1970, and the formation of the National Association for Environmental Education (now known as the North American Association for Environmental Education) in 1971 provided resources to teachers and promoted environmental education programs to improve environmental literacy on a national stage.

Environmental Education Goals and Methods

In the early 1970s the United Nations Education, Scientific and Cultural Organization (UNESCO) refined the definition of environmental education (UNESCO 1977; 1987; 2007; UNESCO-UNEP 1976). That definition states: "The goal of environmental education is: to develop a world population that is aware of, and concerned about, the environment and its

associated problems, and which has the knowledge, skills, attitudes, motivations and commitment to work individually and collectively toward solutions of current problems and prevention of new ones." From this definition, the goals of environmental education can be more clearly defined: (1) awareness, (2) knowledge, (3) attitudes, (4) skills and (5) participation (UNESCO 1978; 2007).

Environmental education efforts must help individuals and society as a whole to acquire *awareness* of and sensitivity to the environment and environmental issues. Part of this awareness comes from increasing *knowledge* and understanding of the natural environment, its processes, and allied issues (Hart 1981; UNESCO 1978). Environmental education seeks to help individuals acquire a set of values and *concerns* for the environment (Hollweg et al. 2011; UNESCO 1978; 2007; UNESCO-UNEP 1976). A crucial goal of environmental education seeks to promote and improve *problem solving and critical thinking skills* in learners (Hart 1981; UNESCO 1978). Finally, environmental education programs provide individuals with *opportunities* for active participation in discussions about and efforts to solve environmental issues (Hollweg et al. 2011; UNESCO 1978; 2007).

With an understanding of the end goals of environmental education, attention can be turned to the methods and processes by which environmental education takes place. Based on UNESCO reports, environmental education is comprised of natural and social science and skill-based education efforts, experience in the environment and opportunities for collaboration and discussion about environmental issues and potential solutions (Hart 1981; UNESCO 1978). These methods are applied in both formal school-based environmental education efforts and informal non-school-based programs. The importance of both formal and non-formal environmental education has been recognized since the early 1970s (Hart 1981; Hollweg et al.

2011; UNESCO 1977; 1978; 2007). Reviews of research indicate that various combinations of formal, non-formal and other environmental experiences for youth have contributed in different ways to the development of environmental literacy and the meeting of environmental education goals (Hollweg et al. 2011).

Informal Environmental Education

Informal or non-school-based environmental education frequently takes place through organizations such as Scouts and 4-H in programs like adventure, recreation and camping experiences (Allen et al. 2011; Ripberger 2008; Schlink 2000). Motivations for participating in outdoor recreation are varied. Some individuals seek adventure, challenge and physical activity; some seek wonder and awe; and others seek restoration and escape from normal routines (Driver et al. 1991; Lekies 2013; Manfredo et al1996). Research on youth experiences in outdoor recreation programs typically focuses on the social, psychological and developmental benefits youth receive (Allen et al. 2011; Caldwell 2005; Caldwell & Witt 2011; Ripberger 2008; Roberts & Suren 2010; Sibthorp & Morgan 2011). Some research has also examined the ways young people can develop bonds with the natural environment through these opportunities (Chawla 1999; 2007; D'Amato & Krasny 2011; Louv 2008; Wells & Lekies 2006).

Environmental Education Research

In what is possibly the most comprehensive review of environmental education research ever undertaken, Rickinson (2001) reviewed over 100 empirical journal articles, books and reports published between 1993 and 1999 about school-based environmental education. The evidence base reviewed in this article is described as large but unevenly focused, methodologically homogeneous and generally fragmented (Rickinson 2001). However, by

observing and analyzing the trends in these publications, three established and three emerging nodes of evidence under which environmental education studies could be categorized were determined. The established nodes or venues of research were: (1) learners' environmental knowledge, (2) learners' environmental attitudes and behaviors and (3) learners' environmental learning outcomes (Rickinson 2001). The emerging, or less developed, categories of research included: (1) learners' experiences of learning, (2) learners influences on adults and (3) perceptions of nature (Rickinson 2001).

Various types of formal and non-formal environmental education programs have contributed to gains in knowledge and positive shifts in attitude (Iozzi 1984; McBeth et al. 2011; Rickinson 2001; Volk & McBeth 1997). Many studies have found that participation in school-based environmental education programming can improve students' short-term environmental attitudes, behaviors and behavioral intentions (Bodzin 2008; Bogner 1998; Cronin-Jones 2000; Leeming et al. 1995; Skelly & Zajiek 1998). Similarly, research has shown that "hands-on" nature experiences and time spent outdoors can provide a meaningful transition to learning and caring about environmental issues (Brody 2005; Burgess & Mayer-Smith 2011; Chawla, 1998; 2007; D'Amato & Krasny 2011; Emmons 1997; Wells & Lekies 2006).

Some studies have found that students' factual environmental knowledge and understanding varied greatly depending on the topic but overall tended to be quite low (Anderson & Moss 1993). Research into the sources of students' environmental knowledge revealed that media, school, family and previous experiences with the environment are all significant sources of information (Bonnett & Williams 1998). Despite the breadth and bulk of the research base, most studies have examined the short-term effects of environmental education on children's

environmental attitudes, behaviors and knowledge, leaving many gaps to be filled by future research efforts (Rickinson 2001; Wells & Lekies 2012).

Youth Perceptions of Nature

In the earliest and most comprehensive study of its kind, Wals (1994) examined perceptions of nature among urban youth ages 12-13 years (N=32). Students of several Detroit metropolitan area middle schools were interviewed about their experiences and understanding of nature. When asked, "What is nature to you?" all youth supplied their unique, preconceived notions of nature. The diversity of their responses reflected the diversity of their experiences with nature, and the multiplicity found within individual responses indicates that each student experienced nature in more ways than one (Payne 1998; Wals 1994). Findings from these original studies showed that nature was seen as a place for entertainment and fun, as a place in which activities and play occur, as a reflection of the romanticized past, as a place for learning about ecological processes, as a peaceful place, as a challenging place, as a threatening place and as a threatened place (Aaron & Witt 2011; Lekies et al. 2013; Wals 1994).

In many studies fear and danger have been predominating perceptions of nature. Studies have identified three categories of worry youth associated with natural areas: 1) potential natural hazards; 2) dangerous people; and 3) inconveniences (Simmons 1994). Fears discussed in research include those of heavily forested areas, water, poisonous plants, wild animal attacks, snakes and insects (Anderson & Moss 1993; Simmons 1994). Additionally, children expressed fears of getting lost and hurt as well as storms and darkness. Encountering dangerous people during environmental excursions proved to be a significant worry (Bonnett & Williams 1998; Simmons 2005). Bixler & Floyd (1999) suggested that disgust, sensitivity and desire for modern comforts may have a greater effect on negative perceptions of natural environments than the

more commonly reported fears of nature and natural conditions. Activities such as stepping in animal droppings, touching or being bitten by insects, contact with swamp water, getting sweaty and dirty, insect bites, dust and mud and unusual smells can all inspire feelings of disgust (Bixler et al. 1994, Bixler & Floyd 1997; 1999).

In the United Kingdom, Bonnett & Williams (1998) conducted a study of primary school (ages 10-12) children's perceptions of and attitudes toward nature and the environment. This study and many others have found that youth associated nature with relaxation, beauty, quiet and privacy and escape or sanctuary from life's problems and stresses (Aaron & Witt 2011; Bonnett & Williams 1998; Burgess & Mayer-Smith 2011; Emmons 1997; Wilhelm & Schnider 2005). Many also expressed strong positive concern for nature – animals, trees, litter and pollution – and seemed to be aware that environmental problems are pervasive (Bonnett & Williams 1998). Many studies have found that children's perceptions of nature were generally positive but characterized by a number of limitations, dichotomies and ambivalences (Aaron & Witt 2011; Bonnett & Williams 1998). Aaron & Witt discuss findings of associations of nature with freedom—a place to play, for animals to roam freely, as well as freedom from rules, worries and structured activities.

The Effects of Experience and Education

Studies of the life experiences of adult environmental professionals have consistently found environmentally related formal and non-formal experiences during their youth to be influential on environmentalism later in life (Chawla 1998; Hollweg et al. 2011; Sward & Marcinkowski 2001). Keliher (1997) found that young children have well-formed perceptions of nature and that nature experiences can determine the complexity and coherence of children's

perceptual frameworks. These studies showcase the importance of understanding how individuals form perceptions of nature so that educators can provide more meaningful learning experiences that foster active environmental concern (Keliher 1997; Payne 1998).

Environmental education efforts have also been shown to alter youth perceptions of nature. Several recent studies have examined how children's perceptions changed through the course of residential outdoor education programs. In these studies participants' perceptions of nature changed over the course of their involvement in the program; there was an increase in the number of children who expressed positive views and a decrease in the number who expressed negative views (Burgess & Mayer-Smith 2011; Emmons 1997). Fears decreased and were changed into respect and empathy for the terrain, wildlife, natural surroundings and predators in the wilderness (Burgess & Mayer-Smith 2011; Emmons 1997). Burgess & Mayer-Smith (2011) concluded that connection and affiliation with the natural world may be cultivated and enhanced through nature experience and environmental education. Emmons (1997) attributed this to be a product of increased conceptual knowledge and understanding of environmental problems such as deforestation. However, a study completed by Wells & Lekies (2006) found that environmental education in childhood did not relate to environmental attitudes in adulthood.

Summary

These studies have shown that much more work is needed to understand how students form perceptions of nature, how these perceptions affect their experience with and the outcomes of environmental education efforts, and what educators can do to address and potentially alter learners' perceptions during environmental education efforts (James & Bixler 2008; Rickinson 2001; 2003). Future research efforts should move toward more rigorous research design that will

provide greater clarity regarding the links between environmental education and experience and participants' environmental attitudes, behaviors, perceptions and other outcomes of interest (Rickinson 2001; Wells & Lekies 2012). Another goal of future research should be to address learners of a variety of ages. Research focused on youth limits the understanding of environmental education to a school-based "teaching" view and ignores the role of prior formative experiences and non-traditional learning efforts (Keliher 1997; Rickinson 2006). In order for environmental education to achieve its goals of inspiring lifelong understanding of the natural environment and concerned action on issues, environmental education research must look much more closely at environmental learning through the life course (Rickinson 2003; 2006).

Chapter III

Methodology and Data

This section details research objectives and describes the study sample, measures and process of analysis.

Research Objectives

The following research objectives guided this study:

1. What percentage of university students participated in environmental education activities as youth?
2. What are college students' perceptions of nature?
3. Is there a difference in perceptions of nature based on experience in environmental education activities?

It was hypothesized that respondents who indicated they had childhood involvement in environmental education programs would rate positive perceptions significantly higher and negative perceptions significantly lower than those respondents who indicated they had not participated in these programs.

Sample

The data used in this study were obtained from a larger study of childhood experiences in nature and adult environmentalism administered to students attending The Ohio State University during the spring of 2012. An e-mail survey was sent to a random sample of 10,146 students, approximately one-quarter of the main campus undergraduate student body who had registered for courses during the previous academic term. Students were contacted via e-mail and received

three reminders to complete the survey. Study participants consisted of undergraduate students attending a large Midwestern university in the United States. A total of 1,281 responses were received, yielding a response rate of 12.6%. For the purposes of this analysis, the sample population was reduced to those who were identified as being between the ages of 18-24, leaving a sample population of 927. An exact response rate is unknown, however, as it is uncertain how many students actually received the survey. Permission to conduct the study was obtained from the Ohio State's Institutional Review Board.

Measures

Environmental Education. The respondents were asked about previous (during the first 18 years of their lives) environmental education experiences. Individuals were asked, "Did you participate in the following organized activities":

1) Nature or environmental education in school;
2) Nature-related activities outside of school, such as through Scouts, 4-H or summer camp?

Possible responses were: "yes," "no" and "not applicable". For the purposes of this study, "not applicable" responses were re-coded as "no".

Perceptions. Six different perceptions of nature were considered in response to the question, "To what extent do you associate nature with the following?" The perceptions included fun and enjoyment, danger, stress reduction, fear, excitement and relaxation. Responses for each item were scored using a five-point Likert-type scale ranging from "Not at all" to "A great deal." For the purposes of this analysis, perceptions were divided into positive and negative. Positive perceptions included fun and enjoyment, stress reduction, excitement and relaxation. Negative perceptions were danger and fear.

Analysis

Data were analyzed using IBM SPSS Statistics v. 20 in order to address the three research questions. This study used descriptive statistics to determine the percent of respondents who had environmental education experience as youth. Means and standard deviation were used to clarify how students valued their perceptions of nature for each of the six options. Independent sample *t*-tests were used to identify any differences of positive and negative perceptions of nature based on prior environmental education experience.

Chapter IV

Findings

In this chapter the findings of the study, which analyzed youth environmental education experience and young adult perceptions of nature, are presented.

Study Participants

Respondents were 36% male and 64% female. They ranged in age from 18 to 24 years old with a mean of 20.81 (SD=1.42). The majority were Caucasian (87.9%). The sample population was 43.6% seniors by rank and 25% juniors, with the rest indicating they were sophomores or freshmen. Comparisons with university data indicated the study sample was disproportionately female, senior and junior rank, and Caucasian compared to the entire population of university undergraduate students. However, respondents represented a wide range of majors and came from all colleges of the university. Over half (52%) of respondents were students in the College of Arts and Sciences, the largest on campus. Approximately 10% of the responses, or 30% total, came from students in each of the following: School of Business, College of Engineering, and College of Food, Agriculture and Environmental Science.

Objective 1: What percentage of university students participated in environmental education activities?

In-school environmental education was nearly equally divided. Approximately half the respondents indicated they had environmental education in school while the other half indicated they did not. Sixty percent of students indicated they participated in nature-related activities outside of school and 40% indicated they had not.

Table 1: Youth Participation in Environmental Education Opportunities (N=922-923)

Organized Activity	Yes	No
Nature or environmental education in school	49.8%	50.2%
Nature-related activities outside of school, such as through Scouts, 4-H or summer camp	60.1%	39.9%

Objective 2: What are college students' perceptions of nature?

Respondents indicated positive perceptions of the environment, with all four positive of the items having mean scores over 3.0 on a 5-point scale. Relaxation was rated highest with a mean of 4.36 (SD=0.77), followed by fun and enjoyment with a mean of 4.32 (SD=0.83), stress reduction with a mean of 4.18 (SD=0.88) and excitement with a mean of 3.91 (SD=0.94). Respondents also indicated negative perceptions of the environment, with both negative items having mean scores below 3.0 on a 5-point scale. Danger and fear were rated much lower than the positive perceptions, with a mean of 2.65 (SD=0.97) and 2.12 (SD=0.95) respectively.

Table 2: College Students' Perceptions of Nature (N=914-916)

Perception	Mean Score	Standard Deviation
Relaxation	4.36	0.77
Fun and enjoyment	4.32	0.83
Stress reduction	4.18	0.88
Excitement	3.91	0.94
Danger	2.65	0.97
Fear	2.12	0.95

Scale 1-5: 1=strongly disagree to 5=strongly agree

Perceptions were divided into two categories and summed for additive positive and negative perception scores. Positive perceptions (fun and enjoyment, relaxation, excitement and stress reduction) had a mean of 16.77 (SD=2.87) over a range of 16. Negative perceptions (fear and danger) had a mean of 4.78 (SD=1.74) over a range of 8. The range of a set of data is the difference between the largest and smallest values. For example, the smallest possible value for positive perceptions is 4 (a rating of 1 for each of the 4 perceptions) and the largest possible value is 20 (a rating of 5 for each of the 4 perceptions). The smallest possible value for negative perceptions is 2 and the largest possible value is 10.

Table 3: Positive and Negative Perceptions (N=910-914)

Perception Category	Mean	Standard Deviation	Range of Scores
Positive	16.77	2.87	16
Negative	4.78	1.74	8

Objective 3: Is there a difference in perceptions of nature based on experience in environmental education activities?

School-based Environmental Education. An independent sample *t*-test was used to identify differences in positive perceptions between those who participated in school-based environmental education and those who did not. Those who participated in school-based environmental education had significantly higher scores that those who did not participate $t(906)=4.34$, $p=.000$. The effect size for this calculation was $d=.29$.

An independent sample *t*-test was used to identify differences in negative perceptions between those who participated in school-based environmental education and those who did not. Those who participated in school-based programs had significantly higher scores than those who did not participate $t(909)=1.99$, $p=.047$. The effect size for this calculation was $d=.13$.

Table 4: T-tests for Environmental Education in School

Participation in Organized Activity	**Perceptions**	**N**	**Mean Score**	**Standard Deviation**	***df***	***t***	***P***	***d***
	Positive							
Yes		454	17.19	2.61	906	4.34	.000	.29
No		454	16.37	3.06				
	Negative							
Yes		455	4.89	1.73	909	1.99	.047	.13
No		456	4.66	1.73				

***Non-school-based Environmental Education*.** An independent sample *t*-test was used to identify differences in positive perceptions between those who participated in nature-related education programs outside of school and those who did not. Those who participated in non-school-based environmental education had significantly higher scores that those who did not participate, $t(904)= 5.02$, $p= .000$. The effect size for this calculation was $d= .33$.

An independent sample t-test was used to identify differences in negative perceptions between those who participated in nature-related education programs outside of school and those who did not. Those who participated in non-school-based environmental education had higher

scores than those who did not participate. The difference approached significance, $t(908) = -1.83$, $p = .068$. The effect size for this calculation was $d = -.12$.

Table 5: T-tests for Nature-Related Activities Outside of School

Participation in Organized Activity	**Perceptions**	**N**	**Mean Score**	**Standard Deviation**	***df***	***t***	***P***	***d***
	Positive							
Yes		547	17.16	2.63	904	5.02	.000	.33
No		359	16.20	3.12				
	Negative							
Yes		550	4.69	1.78	908	-1.83	.068	-.12
No		360	4.90	1.66				

Chapter V

Summary

This section discusses limitations of this research effort, key findings from data analysis and implications of these findings for future research efforts.

Purpose of the Study

The purpose of this study was to analyze the potential impacts of individuals' involvement in organized environmental educational activities as youth on their perception of nature as young adults. The organized activities reviewed within this study were defined as the following: nature or environmental education in school and nature-related activities outside of school (such as through Scouts, 4-H or summer camp). The perceptions of nature considered within the scope of this paper include nature as associated with fun and enjoyment, danger, stress reduction, fear, challenge, excitement and relaxation.

Objectives of the Study

This project was completed to gain insight into whether or not youth participation in environmental education programs influences their perceptions of nature as adults. After reviewing the relevant literature, specific goals were outlined to further define this study's purpose. In order to address these goals, the following objectives were identified:

1. What percentage of university students participated in environmental education activities as children?
2. What are college students' perceptions of nature?

3. Is there a difference in perceptions of nature based on experience in environmental education activities?

It was hypothesized that respondents who indicated they had childhood involvement in environmental education programs would rate positive perceptions significantly higher and negative perceptions significantly lower than those respondents who indicated they had no prior environmental education.

Key Findings

This section discusses key findings of the study and how they relate to research objectives.

Objective 1: What percentage of university students participated in environmental education activities?

Research has shown that "hands-on" nature experiences and time spent outdoors can provide a meaningful transition to learning and caring about environmental issues (Brody 2005; Burgess & Mayer-Smith 2011; Chawla 1998; 2007; D'Amato & Krasny 2011; Emmons 1997; Wells & Lekies 2006). Similarly, many studies have found that participation in school-based environmental education programming can increase students' pro-environmental attitudes, behaviors and behavioral intentions (Bodzin 2008; Bogner 1998; Cronin-Jones 2000; Leeming et al. 1995; Skelly & Zajiek 1998). Yet, half of all study participants indicated they did not participate in environmental education during school as youth, and forty percent of study participants indicated they did not participate in nature-related activities outside of school as youth (such as through Scouts, 4-H or summer camp). Decades of research and policy work recognize environmental education as crucial in dealing with the unprecedented number of critical environmental issues society faces today (Hollweg et al. 2011; Rennie 2008). The

successes of these education efforts depend on creating a society of concerned, educated, skilled and dedicated individuals who will work together for solutions to environmental issues (Hollweg et al. 20011, UNESCO 2007; Wals 1994). Seeing such low participation rates for environmental education and nature-experience programs should cause concern among researchers and educators. This indicates there are significant opportunities for both school and non-school-based environmental education programs to involve children and youth.

Objective 2: What are college students' perceptions of nature?

This analysis showed that college students' perceptions of nature are more positive than negative. These results are similar to those of studies conducted with children and youth. Many studies have found that children's perceptions of nature were generally positive but characterized by a number of ambiguities (Aaron & Witt 2011; Bonnett & Williams 1998). It could also support previous findings that youth environmental education and nature experience are capable of altering perceptions for the better (Burgess & Mayer-Smith 2011; Emmons 1997). Studies have shown that formative, "hands-on" nature experiences and time spent outdoors can set the stage for future environmentalism (Brody 2005; Burgess & Mayer-Smith 2011; Chawla 1998; 2007; D'Amato & Krasny 2011; Emmons 1997; Wells & Lekies 2006).

Objective 3: Is there a difference in perceptions of nature based on experience in environmental education activities?

The *t*-tests presented and discussed in the findings section of this work indicate that there is a significant difference in positive perceptions of those who had environmental education in school as well as through out-of-school activities such as Scouts, 4-H and camps as children compared to those who did not. These findings potentially support previous research that youth

environmental education and experience could transition into positive environmental conceptions and appreciation later in life (Brody 2005; Burgess & Mayer-Smith 2011; Chawla 1998; 2007; D'Amato & Krasny 2011; Emmons 1997; Wells & Lekies 2006). For environmental education to successfully do this, certain program characteristics could be more important than others. Burgess & Mayer-Smith (2011) and Emmons (1997) discuss factors such as teachers and leaders role modeling positive attitudes, hands-on opportunities, and direct experience as being crucial for positive changes in participants' perceptions of nature.

There was also a significant difference in negative perceptions for those who participated in school-based environmental education and those who did not. Those with prior school-based environmental education had significantly higher negative perceptions of nature. Are environmental educators in schools sending negative messages about the environment? Negative perceptions of those with school-based environmental education were higher than those with nature-related, non-school-based environmental experience. This could be due, in part, to an increased factual awareness of environmental hazards and risks with fewer opportunities for the hands-on experience that has been found to change perceptions of fear into respect in the wilderness (Bixler 1994; Burgess & Mayer-Smith 2011; Emmons 1997). The indications of negative perceptions of nature by those with environmental experience outside of schools could be attributed to participants' increased awareness of environmental hazards as a result of the increased knowledge and hands-on experiences these activities provided, instead of being the indication of negative views of the natural environment.

Limitations

There are a number of limitations to this research effort. First, this analysis was limited due to the availability of only a small number of questions about environmental education and perceptions in the overall survey. Much more information, both in depth and breadth, is needed to gain a more complete understanding of the lasting effects of environmental education efforts and adult perceptions of nature. In addition, these questions relied on respondents' memories of environmental education experience. It is impossible to ascertain the extent to which respondents took time to think about or were able to clearly recall their childhood environmental education experiences.

Secondly, it may have been unclear what was meant by "nature or environmental education in school" and "nature-related activities outside of school". The second chapter of this paper discussed the diversity of environmental education efforts. If a lack of clarity in definition exists so completely among educators and researchers, it is likely that the general public and those who responded to this survey also lack a clear understanding. Additionally, the response rate to the survey was low. Those who completed the survey may have done so because they were more enthusiastic about the subject matter than those who did not complete the survey. Social desirability and an unwillingness to appear afraid of or disinterested in nature may have impacted responses. Most importantly, it is possible that other influences on perceptions such as gender, exposure and formative experiences, and location of childhood residence may account for the differences in perceptions of nature.

Implications

"The goal of environmental education is: to develop a world population that is aware of, and concerned about, the environment and its associated problems, and which has the knowledge, skills, attitudes, motivations and commitment to work individually and collectively toward solutions of current problems and prevention of new ones" (UNESCO 1978; 2007). More research into the long-term impacts of environmental education efforts and learners' experiences before and during educational activities is needed for researchers and practitioners to be able to understand how successful education efforts are at meeting these goals.

Understanding college students' perceptions of nature could be extremely useful for university faculty and staff as they design class curriculum and recreation programs and activities and implement sustainability initiatives (such as The Ohio State University's Framework Plan or Zero Waste Initiative at the OSU football stadium). College is typically the last school-based educational opportunity individuals will have in their lives. That means it is a significant opportunity for environmental education and experience programs to influence the lives of individuals who aren't inclined to "go looking" for such opportunities.

References

Aaron, R. F., & Witt, P. A. (2011). Urban students' definitions and perceptions of nature. *Children, Youth, and Environtments, 21(2),* 145-167. Retrieved from http://www.colorado.edu/journals/cye.

Allen, K., Varner, K., & Sallee, J. (2011). Addressing nature deficit disorder through primitive camping experiences. *Journal of Extension, 49(3).* Retrieved from http://www.joe.org/

Anderson, S., & Moss, B. (1993). How wetland habitats are perceived by children: Consequences for children's education and wetland conservation. *International Journal of Science Education, 15(5),* 473-485.

Bixler, R. D., & Floyd, M. F. (1997). Nature is scary, disgusting, and uncomfortable. *Environment and Behavior, 29(4),* 443-467.

Bixler, R. D., & Floyd, M. F. (1999). Hands on or hands off? Disgust sensitivity and preference for environmental education activities. *The Journal of Environmental Education, 30(3),* 4-11. Doi:10.1080/00958969909601871

Bixler, R. D., et al. (1994). Observed fears and discomforts among urban students on school field trips to wildland areas. The *Journal of Environmental Education, 26(1),* 24-33.

Bodzin, A.M., (2008). Integrating instructional technologies in a local watershed investigation with urban elementary learners. *Journal of Environmental Education, 39,* 47-57.

Bogner, F.X. (1998). The influence of short-term outdoor ecology education on long-term variable of environmental perspective. *Journal of Environmental Education, 29,* 17-29.

Bonnett, M., & Williams, J. (1998). Environmental education and primary children's attitudes toward nature and the environment. *Cambridge Journal of Education, 28(2),* 159-175.

Brody, M. (2005). Learning in nature. *Environmental Education Research, 11(5),* 603-621. DOI:10.1080/13504620500169809

Burgess, D. J., & Mayer-Smith, J. (2011). Listening to children: Perceptions of nature. *The Journal of Natural History Education and Experience, 5,* 27-43.

Caldwell, L. (2005). Recreation and youth development. In P. A. Witt and L. L. Caldwell, *Recreation and Youth Development* (pp. 169-189). State College, PA: Venture Publishing, Inc.

Caldwell, L. L., & Witt, P. A. (2011). Leisure, recreation, and play from a developmental context. *New Directions for Youth Development, 130, Summer,* 13-27.

Chawla, L. (1998). Significant life experiences: A review of research on sources of environmental sensitivity. *The Journal of Environmental Education, 29* (3), 11-21.

Chawla, L. (1999). Life paths into effective environmental action. *The Journal of Environmental Education 31*(1): 15-26.

Chawla, L. (2007). Childhood experiences associated with care for the natural world: A theoretical framework for empirical results. *Children, Youth, and Environments 17(4)*: 144-170. Retrieved March 12, 2011 from http://www.colorado.edu/journals/cye.

Cronin-Jones, L.L. (2000). The effectiveness of schoolyards as sites for elementary science instruction. *School of Science and Mathematics, 100,* 203-211.

D'Amato, L. G., & Krasny, M. E. (2011). Outdoor adventure education: Applying transformative learning theory to understanding instrumental learning and personal growth in environmental education. *The Journal of Environmental Education, 432(4),* 237-254.

Driver, B. L., Tinsley, H., & Manfredo, M. J. (1991). Results from two inventories designed to assess the breadth of the perceived psychological benefits of leisure. In B. L. Driver, P. J. Brown, & G. L. Peterson (Eds.), pp. 263-286. *Benefits of Leisure.* State College, PA: Venture Publishing, Inc.

Emmons, K. M. (1997). Perceptions of the environment while exploring the outdoors: A case study in Belize. *Environmental Education Research, 3(3),* 327-344.

Hart, E.P. (1981). Identification of key characteristics of environmental education. The *Journal of Environmental Education, 13(1),* 12-16. DOI: 10.1080/00958961.1981.9943018

Hollweg, K. S., Taylor, J. R., Bybee, R. W., Marcinkowski, T. J., McBeth, W. C., & Zoido, P. (2011). Developing a framework for assessing environmental literacy. Washington, DC: *North American Association for Environmental Education*. Available at http://www.naaee.net.

Iozzi, L. (Ed.). (1984). A summary of research in environmental education, 1971-1982. The second report of the National Commission on Environmental Education Research. Monographs in environmental education and environmental studies, volume II. Columbus, OH: ERIC/SMEAC.

James, J. J., & Bixler, R. D. (2008). Children's role in meaning making through their participation in an environmental education program. *The Journal of Environmental Education, 39(4),* 44-59.

Keliher, V., (1997). Children's perceptions of nature. *International Research in Geographical and Environmental Education, 6(3),* 240-243.

Leeming, F., Dwyer, W., & Bracken, B. (1995). Children's environmental attitude and knowledge scale: Construction and validation. *The Journal of Environmental Education, 26* (3), 22-31.

Lekies, K.S., Yost, G.M., & Rode, J. (2013). Urban youth's experiences of nature: Implications for outdoor adventure recreation. *Manuscript Submitted for Publication.*

Louv, R. (2008). *Lost child in the woods: Saving our children from nature deficit disorder (2nd ed.).* Chapel Hill: Algonquin Books.

Manfredo, M. J., Driver, B. L., & Tarrant, M. (1996). Measuring leisure motivations: A meta-analysis of the recreation experience preference scales. *Journal of Leisure Research, 28(3),* 188-213.

McBeth, W., Hungerford, H., Marcinkowski, T., Volk, T., & Cifranick, K. (2011). *National Environmental Literacy Assessment, Phase Two: Measuring the effectiveness of North American environmental education programs with respect to the parameters of environmental literacy. Final research report*. Carbondale, IL: CISDE. Available at http://www.oesd.noaa.gov/pubs_reports/NELA_Phase_Two_Report_020711.pdf.

Payne, P. (1998). Children's conceptions of nature. *Australian Journal of Environmental Education, 14,* 19-26.

Rennie, S. (2008). Toward a 21st-century understanding of humans' relation to nature: Two hats? *The Journal of Environmental Education, 40(1),* 55-61.

Rickinson, M. (2001). Learners and learning in environmental education: a critical review of the evidence. *Environmental Education Research, 7(3),* 207-317. DOI:10.1080/1350462012006523 0

Rickinson, M. (2003). Reviewing research evidence in environmental education: some methodological reflections and challenges. *Environmental Education Research, 9(2),* 257-271 DOI:10.1080/1350462032000068884

Rickinson, M. (2006). Researching and understanding environmental learning: hopes for the next 10 years. *Environmental Education Research, 12(3-4),* 445-457. DOI:10.1080/13504620600799182

Ripberger, C. (2008). Adventure programming in an after school environment. *Journal of Extension, 46(2).* Retrieved from http://www.joe.org/

Roberts, N. S., & Suren, A. T. (2010). Through the eyes of youth: A qualitative evaluation of outdoor leadership programs. *Journal of Park and Recreation Administration, 28(4),* 59-80.

Saylan, C. & Blumstein, D.T. (2011) The failure of environmental education and how we can fix it. Berkeley & Los Angeles, California: University of California Press, Ltd.

Schlink, K.S. (2000). Addressing educational needs of youth in today's society. *Journal of Extension, 38(4).* Retrieved from http://www.joe.org/

Sibthorp, J., & Morgan, C. (2011). Adventure-based programming: Exemplary youth development practice. *New Directions for Youth Development, 130, Summer,* 105-119. L. R. Allen & R. J. Barcelona Eds.

Simmons, D. A. (1994). Urban children's preferences for nature: Lessons for environmental education. *Children, Youth, and Environments, 11(3),* 28-40. Retrieved from http://www.coloardo.edu/journals/cye/

Skelly, S.M. & Zajiek, J.M. (1998). The effects of an interdisciplinary garden program on the environmental attitudes of elementary students. *HortTechnology, 8,* 579-583.

Stapp, W.B., et al. (1969). The concept of environmental education. *The Journal of Environmental Education, 1(1),* 30-31.

Sward, L., & Marcinkowski, T. (2001). Enviornmental sensitivity: A review of the research 1980-1998. In H. Hugherford, W. Bluhm, t. Volk, & J. Ramsey (Eds.) *Essential readings in environmental education* (pp 277-288). Champaign, IL: Stipes Publishing L.L.C.

UNESCO. (1977). *Trends in environmental education*. Paris, France.

UNESCO. (1978). *Final report: Intergovernmental conference on environmental education*. Paris, France.

UNESCO. (1987). Moscow '87: UNESCO-UNEP International Congress on Environmental Education and Training. *Connect: UNESCO-UNEP Environmental Education Newsletter, 12* (3), 1-8.

UNESCO. (2007). Moving forward from Ahmedabad…Environmental education in the 21st century. Unpublished report of the Fourth International Environmental Education Conference, 26-28 November 2007, Ahmedabad, India.

UNESCO-UNEP. (1976). The Belgrade Charter. *Connect: UNESCO-UNEP Environmental Education Newsletter, 1* (1), 1-2.

van Andel, J. (1990). Places children, like, dislike, and fear. *Children's Environment Quarterly, 7(4),* 24-31.

Volk, T., & McBeth, W. (1997). *Environmental literacy in the United States*. Washington, DC: North American Association for Environmental Education.

Wals, A. E. J. (1992). Young adolescents' perceptions of environmental issues; implications for Environmental education in urban settings. *Australian Journal of Environmental Education, 8,* 45-58

Wals, A. E. J. (1994). Nobody planted it, it just grew! Young adolescents' perceptions and experiences of nature in the context of urban environmental education. *Children, Youth, and Environments, 11* (1-27). Retrieved from http://www.coloarado.edu/journals/cye/

Wells, N. M., & Lekies, K. S. (2006). Nature and the life course: Pathways from childhood experiences with nature to adult environmentalism. *Children, Youth, and Environments, 16* (1-24). Retrieved June 15, 2006 from http://www.coloarado.edu/journals/cye/

Wells, N. M. & Lekies, K.S. (2012). Children and nature: Following the trail to environmental attitudes and behaviors. In J.L. Dickinson & R. Bonney (Eds.), *Citizen science: Public participation in environmental research* (p. 201-213). Ithaca, NY: Comstock Publishing Associates.

Wilhelm, S. A., & Schneider, I. E. (2005). Diverse urban youth's nature: Implications for environmental education. *Applied Environmental Education and Communication, 4*, 103-113.